May 1995

The Probe, Issue #154 -- May 1995

The Prairie NADCA
ISSUE 154
MAY 1995

Understanding the Eastern Coyote - Part I*

Thomas N. Tomsa, Jr., USDA-APHIS-ADC, Pennsylvania

Over the past decade the coyote's (*Canis latrans*) blitz across the East has evoked awe and consternation among hunters, trappers, farmers, wildlife enthusiasts, and wildlife managers. Rapid growth of coyote populations in every eastern state has generated concerns about impacts on agriculture, game animals or other native wildlife, and, to a lesser extent, people and companion animals. Attitudes regarding the management of the species range from total protection to eradication, complicating the development of appropriate management objectives, strategies, and programs, which must balance a variety of interests. In formulating recommendations for mitigation of coyote damage, wildlife damage biologists in the East can draw from the body of knowledge amassed by our western counterparts, but must also consider social and environmental conditions and limitations, as well as significant behavioral and biological differences unique to coyotes in the Eastern United States. The following review of the coyote's range extension eastward, evidence and implications of hybridization (Part I), eastern coyote damage trends and organized operational control efforts (Part II), has been compiled from published literature, newspaper reports, incident investigation reports, ADC activities reports, and personal communications.

Coyote Range Extension Eastward

Prior to colonization of North America by Europeans, coyotes were generally restricted to the prairie regions west of the Mississippi River, ranging from southern Canada to central Mexico (Moore and Parker 1992). In the early 1900s, deforestation and conversion to agriculture created ecological conditions favorable to coyote colonization in the Eastern United States. Populations of gray wolves (*Canis lupus*), mountain lions (*Felis concolor*) and grizzly bears (*Ursus arctos*) were decimated, reducing competition and facilitating pioneering movement of prairie region coyotes into northern Minnesota, Wisconsin, and Michigan's Upper Peninsula (Gilbert 1991). During the 1920s and 1930s, coyotes continued to extend their range along the shores of the Great Lakes, and by the late 1930s, had established small but persistent populations in northern and western New York, western Pennsylvania, and Maine (Severinghaus 1974, Hilton 1978, McGinnis and George 1980). The 1940s and 1950s saw continued growth of these populations and expansion into Vermont, New Hampshire, New Jersey, Massachusetts, and Connecticut (Moore and Parker 1992). Continued growth and expansion through the 1960s and 1970s culminated in the crossing of the Mid-Atlantic frontier in the 1980s, when populations were established in Virginia, West Virginia, and Maryland. During the same period populations virtually exploded in the deep South, with annual coyote harvests in Mississippi growing from 1200 (1980) to 20,000 (1983) to 40,000 (1988). Mississippi's present coyote population is estimated as high as 400,000 (Bourne 1991). Coyote population growth in the Northeast through the 1980s, although less dramatic, was also impressive. Annual coyote harvests in Pennsylvania were reported at 200 in 1982, 500 in 1988, and 4,400 in 1992 (Hayden 1989, Hayden pers. comm.).

Evidence of Hybridization

The northeastern coyote, formerly referred to as the New England canid, appears to be a stable sub-species with predominantly coyote background and possible introgression of wolf and dog genes (Gilbert 1991). These coyotes are 20-30% larger than those found throughout most of the western range. Males range from 35-45 pounds, with individuals up to 55 pounds verified. Females average 5-10 pounds less. Total length ranges from 48-60 inches, tail length 16-18 inches. Skulls are larger, with morphology (prefrontal prominence, bite ratio) seemingly intermediate between western coyotes and wolves. Eastern coyote pelage is considered to be darker overall and more variable than in western specimens. Typical pelage pattern consists of tan/gray frontal areas, buff underside, rufous/tan ears, legs and flanks, with black dorsal accents defining the mane, back and tail. A well-defined black stripe often accents the front of each foreleg. Variations from pure black to nearly white have been observed, with black and red phrases relatively common in some locales. Approximately 20% of the coyotes taken from 1990-1993 in response to live-

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Book Review – "Red Fox: The Catlike Canine"

Stephen Vantassel, NWCO Coorespondent

J. David Henry. Red Fox: The Catlike Canine. Washington D.C.: Smithsonian Institution Press, 1986. 177 pp. with index.

David Henry has produced an extremely informative and readable book about the red fox. The book is the distillation of Henry's field observations of fox behavior while in Saskatchewan's Prince Albert National Park. This area was chosen because foxes have not been trapped here in over fifty years.

The author dutifully covers necessary topics about fox biology. Chapters cover courtship, diet, hunting habits and anatomy. But don't be left with the impression that this is a sterile biology book filled with eye-glazing facts and figures. Instead, the author discusses the topics in a masterful style that only comes from one who has truly learned about the fox. He properly talks about fox behavior in general terms without getting bogged down into all the exceptions often required by more rigid scientific texts. Readers will be pleasantly educated by those passages where the author dialogs with broader biological theories concerning animal development and behavior.

As one who has never trapped fox, I found Henry's observations on fox urinating habits to be quite interesting. This is especially true in light of all the talk about fox urine in trapping fox in the various trapping guides. First, foxes rarely if ever release more than one ounce of urine at one time. In fact, he noted that fox tend to urinate a little at a lot of different times. Second, he found that scent posts, those areas where foxes mark their territory, constituted only 12% of their urinating behavior. Urine posts were only refreshed about once every two days. Finally, he discovered that the majority of fox urination centered arond their scavenging activities. Foxes urinated when they found even the suggestion of food.

More importantly for animal controllers is the author's discoveries regarding the way foxes cache food. What he discovered was that a fox can survive on one pound of meat per day. Thus when foxes gather more food, they store it for a rainy day. He found that foxes were careful to spread the food out into various caches. This way the fox prevents losing all the food should a cache be discovered by various robbers. A cache is made by digging out a small hole only a few inches into the soil. Foxes carefully remove surface debris, dig the hole, bury the food, and recover the site by precisely reversing the steps so that the surface debris is added last. The reason for this precise work is to camouflage the location. The hole can't be too deep otherwise the fox won't be able to smell it. Neither can it be too

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The Probe is the newsletter of the National Animal Damage Control Association, published 11 times per year.

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Your contributions to *The Probe* are welcome. Please send news clippings, new techniques, publications, and meeting notices to *The Probe*, c/o Hopland Research & Extension Center, 4070 University Road, Hopland, CA 95449. If you prefer to FAX material, our FAX number is (707) 744-1040. The deadline for submitting material is the 15th of each month. Opinions expressed in this newsletter are not necessarily those of NADCA.

CALENDAR OF UPCOMING EVENTS

July 16-21, 1995: 10th International Conference on Bear Research and Management. University of Alaska, Fairbanks, AK. Contact: Harry Reynolds, AK Dept. of Fish & Game, 1300 College Road, Fairbanks, AK 99701-1599. Telephone (907) 452-1531. FAX (907) 452-6410.

August 8-10, 1995: Bird Strike Committee—USA 1995. Dallas-Ft. Worth, Texas. Contact: James E. Forbes, USDA/APHIS/ADC, P.O. Box 97, Albany, NY 12201-0097. Telephone (518) 431-4190.

August 8-10, 1995: Symposium on Repellents in Wildlife Management, Sheraton Hotel, Denver Tech Center, Denver, Colorado. Call for papers on following topics: *Characteristics of Repellency, Bird and Mammal Repellents, Sensory and Feeding Repellents, Conservation Use Applications, Requirements for New Products*, and *Future Research Needs*. Contact: Office of Conference Services, Colorado State University, Fort Collins, CO 80523. Telephone (303) 491-7501 or FAX (303) 491-0667.

October 8-11, 1995: Annual Conference of The Society for Vector Control, Holiday Inn University Park, Fort Collins, Colorado. Contact: Justine Keller, P.O. Box 87, Santa Ana, CA 92702; Telephone (714) 971-2421, FAX (714) 971-3940.

November 5-8, 1995: Seventh Eastern Wildlife Damage Management Conference, Holiday Inn North, Jackson, Mississippi. Contact: Phil Mastrangelo, USDA/APHIS/ADC, P.O. Drawer FW, Room 200, Forest Resources Bldg., Mississippi State University, Mississippi State, MS 39762. ***NADCA Annual Meeting will be held in conjunction with this Conference.***

ADC News, Tips, Ideas , Publications . . .

Goldfinches Devastate Strawberry Crop

A new problem has arisen for Louisiana strawberry growers. American goldfinches, a common sight in Louisiana's strawberry belt, began eating the minute seeds of the fruit, wounding the berries and allowing the entry of bacteria and fungi. Upon inspection of the fruit, damage was obvious and the hulls of discarded seed could be found in the dead air spaces under the leaves and berries. One producer reported the loss of 10,000 flats of berries from his 40-acre farm; value was estimated at $120-200 thousand. Another producer reported losing $7,000 in just one day. Various types of noise-making equipment is being tested in a harassment program to keep the birds away from the berries.

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Book Report. . .

shallow for the food will spoil. What was interesting about their activity is that a fox never urinates where it caches food. Henry discovered that foxes urinate only where the food smell suggested food, but that there wasn't any usable food available. He also discovered that where the food odor was particularly persistent, such as with a bone, the fox would mark the site with feces.

You might be wondering about the reasons why fox trappers are successful using urine along with bait in trapping fox if foxes urinate where there is no food. Well, Dr. Henry also found that if the smell of food is particularly strong, foxes would ignore the urine and dig after the food. I might also point out that Charlie Dobbins in his newly-released video "The Dirt Hole and Its Variations" makes his sets to exploit these fox caching characteristics. For example, he uses fox urine when he wants the fox to think that there is no food in the hole and trap it as it investigates. I hope this information will help you reevaluate your use of urine in catching foxes. Chances are, you're using too much and in the wrong situations.

If you're looking for a book on foxes, I would strongly suggest this one. I am sure that it will assist you in appreciating the wonderment of this beautiful creature as well as help you understand how to catch him. Understand that this text is not a trapping manual, but I am confident that it will help you. You should be able to find the book at the library of your local college or university. But if you would like to own *Red Fox: Catlike Canine*, you can still purchase it by calling your local bookstore and hav them order it. The hardcover price quoted to me was $28.00

Stephen Vantassel, E-mail ADCTRAPPER@aol.com

Blast Ignited Over Frozen Gopher

An explosion that rocked an elementary school April 4 in Ceres, California occurred when three maintenance workers attempted to freeze a gopher. According to a report in the April 5 issue of the Santa Rosa *Press Democrat*, after the three sprayed the gopher with a freezing solvent, one of them attempted to light a cigarette. They were blown out of a utility closet where they were using Misty Gum Removal to spray the gopher, apparently in an attempt to euthanize the rodent. All three custodians were injured, along with sixteen pupils. Two of the school employees were hospitalized. The police found the gopher unharmed and released it into a nearby field.

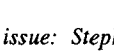
Other gopher removal methods had been previously used, including drowning, poisoning, smoke bombs and even banging them over the head with a blunt object. According to one of the workers, Jeff Davis, the spraying method resulted because they didn't think the other methods were appropriate, especially if children were watching.

Leg Traps Barred – Arizona Ranchers Worried

In March, Arizona Attorney General Grant Woods upheld a November 1994 initiative that keeps ranchers from using leg traps to cap ure wildlife. According to a report in the March 25 issue of the Florance *Blade-Reminder*, the decision has angered Arizona cattleman who said they have no other way to deal with animals killing their livestock. The law also specifically forbids cable snares on public land, which ranchers feel will increase their already heavy losses.

C.B. "Doc" Lane of the Arizona Cattle Growers Association stated that in the last five years the mountain lion population has exploded. Lane criticized the Arizona Game and Fish Department for ignoring the problem. Patrick O'Brien, a Game and Fish spokesman, contradicted Lane, saying the mountain lion population has remained steady for the last 25 years. "People are just coming into contact with them more often because housing subdivisions are being built farther into the desert," he said.

According to O'Brien, there are 2,500 to 3,000 mountain lions living in Arizona. The animals are concentrated around Wickenburg, Tucson, Oro Valley, and the edges of Phoenix. Besides, said O'Brien, this is an initiative put in place by the people and "...we certainly can't go contradictory to the law." He said the Department didn't have any advice for livestock operators.



The editors of **The PROBE** *thank contributors to this issue: Stephen Vantassel, Pink Madsen, James E. Forbes, and Wes Jones. Send your contributions to* **The PROBE**, *4070 University Road, Hopland, CA 95449.*

Helping to Make Trapping "PC"*

Richard B. Chipman, WIdlife Biologist, USDA-APHIS-ADC, Vermont; Co-Editor, Technical Notes

"All trappers should be shot," huffed the woman loud enough for her school-age children and us to hear as she walked by the Vermont Trappers Association booth at a local fair. Trapping and trapping policies in the United States have been challenged for close to 90 years. More than 450 anti-trapping bills have been introduced at the state and federal level since 1900. The most recent issue with broad implications for trapping and wildlife management is the adoption of a law by the European Economic Community (EEC) that prohibits the import of pelts and fur products of 13 species from those countries that either do not ban foothold traps or adopt international humane trapping standards by 1995 (recently extended). Today, trapping appears to be socially and politically unacceptable to many segments of our population. In short, trapping is no longer politically correct ("PC").

Currently, one of the "must read" books in Washington is *Reinventing Government* by Osborne and Gaebler. The authors state that much of the difficulty in government today stems from the fact that both our culture and our government are future blind. In this case, however, if current trends continue, it is not difficult to predict the future of trapping.

Many biologists believe that the growing anti-trapping sentiment and the EED ban will lead to a shift in furbearer management from a renewable resource-based activity to one that is based entirely on problem wildlife management. This may result in a change in the way we do business in the near future. Ultimately, it may mean more wildlife damage management work with fewer available techniques to do the job.

A long time government employee once told me that the key to fighting political battles is "knowing when to tiptoe and when to stomp". Trapping is an issue that we as biologists often tiptoe in, through, and in many cases, around because of its politically controversial nature. Stomping we are told is not PC. However, loud, long, emotionally-charged stomping often communicates the message better than treading lightly around the issue.

Each one of us needs to decide the breadth of our professional responsibilities in helping to get a fact-based message regarding trapping out to the public. In my opinion, wildlife biologists need to take a proactive approach toward fostering an unclouded understanding among the general public of the role trapping plays in managing our natural resources. We also need to become an effective advocate for the tools of our profession.

Wildlife damage biologists in both the public and private sectors have an obligation to use only those techniques that are effective, selective and humane as possible. Some might argue (and I am) that we also have a professional obligation to preserve the legal use of those tools while concurrently promoting research on new and improved techniques that help us meet our management objectives. Trapping remains an important wildlife damage control technique in a shrinking Integrated Pest Management tool chest.

Somebody once said, "If you have the law on your side, speak the law; if you have the facts on your side, speak the facts; if you have neither on your side, pound the table." Trapping opponents have become politically astute table pounders. With little else, they have effectively and dramatically communicated their fabricated messages and are winning the political battles. As biologists, we should be intimately familiar with biological fact and the law. Our strategy should be to stick to the law, stick to the facts, and get better at pounding the table.

A unique and progressive strategy that takes a non-combative, educational approach to the trapping issues is the Joint Trapping Initiative (JTI) developed in New York and Vermont. The public and private partnership among Wildlife Management Agencies (NY-DEC, VT F&W, USDA-APHIS-ADC) and the State Trappers Associations promotes awareness and understanding of trapping and its multiple benefits with the goal of sustaining and improving trapping in those states.

The JTI focuses on three aspects of trapping: (1) public education; (2) trapper education; and (3) the support, review and implementation of new research on traps. The JTI concept originated in New York and spread to Vermont as a result of increased frustration over the continued controversies regarding the ethics of trapping that are draining the already strained resources of environmental agencies and robbing them of time that could be devoted to important wildlife projects.

The JAI promotes the following key messages:

(1) Furbearers are abundant,

(2) Trapping is highly regulated,

(3) Trapping provides many benefits,

(4) Trapping is ecologically sound, (*and I always add a fifth*)

(5) Trapping is an important tool to reduce human-wildlife conflict.

These statements are simple and to the point. The goal is to state the facts—not to make apologies. They also provide a convenient stepping stone for more in-depth discussion. Nobody is stubbornly advocating maintaining the status quo. In fact, both recreational trappers and wildlife damage biologists have historically adopted those technologies that work best. Trap manufacturers and the USDA-APHIS-ADC's Denver Wildlife Research Center will continue to look at alternatives to current methods for capturing wildlife. If and when a better mouse trap is available (and is a technique that is both humane and biologically sound) we should be the first to embrace its use.

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Changing Times

James Forbes, NADCA President

When I was a young lad many, many years ago, life was pretty simple. Things were predictable. Animals did what animals were supposed to do.

Years ago, badgers ate mostly pocket gophers; coyotes hunted as singles or in pairs; and fox and skunk (not bobcats) carried rabies. Mountain lions (we kids called 'em cougar or puma — sounded neater) lived in remote places, seldom seen by people, and ate deer.

Well, times have changed — look what these critters were doing last month:

A North Dakota hog producer asked ADC for assistance when 42 of his 20- to 30-pound pigs mysteriously disappeared from their holding pens over a several-night period. He suspected that coyotes were responsible for the loss. An ADC specialist investigated and found a badger hole hidden under some lumber in a corner of the barn. After removing the badger, the specialist excavated the hole and found a cache of uneaten pigs. No further losses were noted after the badger was removed.

A sheep producer in Montana lost 30 ewes to coyotes in two nights in January. Some of the ewes were killed in typical coyote fashion with bites to the throat, but others appeared to have died from exhaustion during the attack. At the time of the attacks, the sheepherder observed two coyotes decoy the livestock guarding dogs away from the sheep and over a hill. Six other coyotes then attacked the sheep. ADC specialists removed several coyotes with aerial hunting and ground methods before the losses stopped. ADC is noting an increase in the number of incidents where coyotes were outsmarting or over-running guarding dogs that are protecting bands of sheep.

Animal Damage Control personnel in Texas were called to investigate a strange-acting bobcat that was lingering at a campground. The cat retreated under a motorhome amidst campsites and campers. As an ADC specialist approached the cat with a catchpole, the animal attacked him and latched onto his head and shoulder with tooth and claw. After a brief struggle, the cat was thrown to the ground where it was shot. The cat tested positive for rabies, and the ADC specialist is receiving post-exposure booster vaccinations for rabies. No other people were injured by the animal.

When an elderly woman in Idaho heard a thump on her door one evening in February, she turned on the light and saw a cougar sitting on the front porch eating her cocker spaniel dog. She called a neighbor who came over to help. He found the woman's cat dead on the lawn as well as the remains of the dog. He shot at the cougar but missed. The woman called an ADC specialist and by using hounds, he located and shot the lion in an abandoned pigpen. Several other residents in the area had apparently lost pets but had not requested assistance from ADC.

Trapping Weasels

James Forbes, NADCA President

As I write this, April is almost here. Weasel pelts are turning from white to brown. Weasel trapping is over until next fall. So let's talk about the NADCA Regional Directors Meeting of March 27th.

This is what is going on:

We had two changes in Regional Directors. Peter H. Butchko will replace Marty Fedrick in Region 8. Marty has taken a leave of absence to help his brother start a new business. William C. Hickling will replace Eugene LeBoeuf in Region 8, as Gene leave FAA and moves to Albuquerque to join the U.S. Air Force BASH Team. We wish all four Directors good luck coming and going.

With the NADCA election coming up in November, we have appointed our nominating committee: Wes Jones, Chairman; Rich Chipman, Craig Coolahan, Don Mott and Stephen Vantassel, members. We hope many of you will run for office. If you have a hard-working friend, please nominate him/her, but—ask them first.

Plans are almost complete for the merger of the National Urban Wildlife Management Association with NADCA. By the time you read this, the official announcement will have been made at the Great Plains Meeting in Tulsa, Oklahoma. As a result, we will soon be organizing an ad hoc Urban Affairs Committee, and if any of you would care to serve on this committee, please let me or your Regional Director know.

The Directors have also discussed the issue of chapter affiliation. We have an Affiliate Chapter in Connecticut, but interest is growing in Ohio, New York, and Massachusetts.

Other items discussed were: 1. Plans for the NADCA Membership Meeting in Tulsa. 2. We will be ordering more "NADCA LOGO" caps. If you want one, call Wes Jones. 3. Wes is now on the INTERNET, so you can contact him (e-mail address: wrjones@mail.wiscnet.net) and give him your computer address. 4. Finally, we discussed a larger PROBE which may be printed 12 times each year.

Editor Bob Timm has told me I've used too much PROBE space. (*Editor's Note: Not so!*) Must close. Good-bye.

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"PC" Trapping

In the meantime, we need to on the front line citing the law, citing the facts, and pounding the table to get the message out. Then, and only, then will trapping be accepted by a broader range of the public and ultimately become PC

**This editorial first appeared in the Spring 1993 edition of "Technical Notes," the newsletter of the Northeast Association of Wildlife Damage Biologists.*

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Understanding the Eastern Coyote - Part I

stock losses under the Virginia Cooperative Coyote Damage Control Program were black phase animals.

These physical characteristics have led several investigators to suggest that the canids which pioneered the Northeast may have been genetically influenced by hybrid progeny of coyotes and wolves, which share the same sexual cycle, backcrossing into the expanding coyote population. The recent development of DNA analysis techniques further support this hypothesis. By analyzing mitochondrial DNA, Lehman et al. (1991) found that 7 of 13 gray wolf genotypes were clearly of coyote origin, indicating that genetic transfer of coyote mtDNA into wolf populations has occurred through hybridization. Hybrids were confined to Minnesota, Ontario, and Quebec. The frequency of hybrids in these areas exceeded 50%. The ecological history of the hybrid zone suggests that hybridization may occur where coyotes have recently become abundant following conversion of forests to farmland. Dispersing male wolves unable to find mates may pair with female coyotes in deforested areas bordering wolf territories (potential for extensive genetic exchange between closely related species when ecological conditions change suddenly). In other areas where these species overlap and conversion to agriculture is slow or non-existent, wolves do not appear to possess coyote genotypes. Interspecific partitioning, either spatial or behavioral, may be sufficient to prevent hybridization.

Other investigators believe that the observed characteristics of eastern coyotes represent a phenotypic response to environmental conditions and prey availability. Thurber and Peterson (1991) maintain that larger body size is more likely a phenotypic response to size and abundance of prey than a result of hybridization with wolves. These findings are based on a study of coyotes on the Kenai Peninsula of Alaska. Coyotes had colonized the peninsula several decades prior to recolonization by gray wolves, following their earlier extirpation. The authors suggest that since coyotes from this region, where they are sympatric with wolves, were no larger than coyotes from regions where wolves were not present, that hybridization is probably not the best explanation for the observed variation in body size. The underlying assumption for this rational is that hybridization would occur if both species were present, regardless of the ecological conditions that might influence their interactions.

Reproduction in Eastern Coyotes

Breeding in eastern coyotes may occur from late January to early March, but usually peaks in mid-February (Hamilton 1966, Hilton 1976). Males are fertile December through March, and females are fertile, with one 4-5 day estrous period, from late January through early March. Litters of 5-7 pups are born from late March to early May, peaking in mid-April, after a gestation period that averages 63 days (Chambers 1992). Pups are weaned after 3-4 weeks, depending initially on regurgitated semi-solid food and then on solid food brought to the denning area by adults and sub-adults during June and July. Pups are considered to be independent by August-September. Coyote pups reach a weight of 20-30 pounds during September or October when they are about 6 months of age.

Eastern coyote reproductive performance has not been comprehensively examined, and changes in productivity in response to population density, food resources and other factors are not well understood. Reproductive performance of coyotes in the Northeast is somewhat higher than in the West, possibly due to lower population densities in the northeastern range, where saturation levels have not been achieved (Chambers 1992). Contrary to earlier belief, female eastern coyotes can and often do breed in their first year. Rates of ovulation and embryo implantation as evidenced by placental scarring, ranging from 10-50% have been reported (Harrison 1989, Chambers 1992).

Eastern Coyote Social Organization

The social organization of coyotes in the Northeast may differ from that of their western counterparts as a result of the questionable taxonomic status (possible ancestral hybridization), higher availability and utilization of large prey, such as white-tailed deer, and other factors. In their historical (pre-European) range, coyotes are monogamous and the primary social unit is the mated pair and their young of the year. Several investigators (Camenzind 1978, Bekoff and Wells 1980, Bowen 1981) have documented pack formation in coyotes resulting from delayed dispersal and maintenance of extended social bonds among mated pairs of resident adults, their pups and other non-breeding adults or subadults that have not dispersed. Pack formation is believed to increase both efficiency in killing large ungulates (Bowen 1981, 1982) and ability to defend and maintain exclusive use of carcasses (Camenzind 1978, Bekoff and Wells 1980). Pack formation may also be influenced by the degree of exploitation of the coyote population and resulting availability of unoccupied breeding territory (Andelt 1985).

The importance of white-tailed deer in the diet of eastern coyotes has been widely documented (Hamilton 1974, Harrison and Harrison 1984, Major and Sherburne 1987, Person 1988, Litvaitis and Harrison 1989, Brock 1992). High deer densities and the availability of alternate prey in many eastern states appear not only to preclude the need for dispersal but to facilitate the maintenance of extended associations, which may increase efficiency in hunting, defending food resources and providing for and protecting young. Person and Hirth (1991) observed nonbreeding adult associates in a coyote population inhabiting an agricultural region of Vermont, and Brock (1992) documented coyote packing and deer predation in New York's Central Adirondack Mountains. Where deer densities are low and there is a lack

of diversity of alternate food items, such as areas comprised of continuous spruce-fir forests north of 42 degrees latitude (e.g. Maine), low food availability may necessitate dispersal, precluding pack formation (Harrison 1992).

Editors' Note: This article is Part I in a 2-part series on the eastern coyote. Look for Part II in the June issue of The PROBE.

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Proceedings Available

Back issues of Proceedings from the three major wildlife damage conferences are available, if you know where to ask. Costs vary, so check with the source before you order. Ask about shipping costs, and to whom payment should be made.

For the Vertebrate Pest Conference (Calif.), contact Terry Salmon, DANR-UC Davis, Davis, CA 95616-8575, phone (916) 754-8491. Back Proceedings still available include the 16th (1994), 15th (1992), 14th (1990), 13th (1988), 10th (1982), 8th (1978), 7th (1976), 6th (1974), and 5th (1972).

For the Great Plains Wildlife Damage Control Workshop, contact the host institution as follows: 11th (1993) - Div. of Continuing Ed., Kansas State Univ.; 10th (1991) - Scott Hygnstrom, Univ. of Nebraska-Lincoln; 9th (1989) - Bill Andelt, Colorado State Univ.

For the Eastern Wildlife Damage Control Conference, contact the following individuals: 6th (1993) and 5th (1991) - Mike King, Univ. of TN, Knoxville, phone (615) 974-2706; 4th (1989) - Paul Curtis, Cornell Univ., phone (607) 255-2835.

For a complete listing of available Proceedings of these three conferences as well as other related publications, see the Proceedings, 16th Vertebrate Pest Conference, pages 350-351.

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